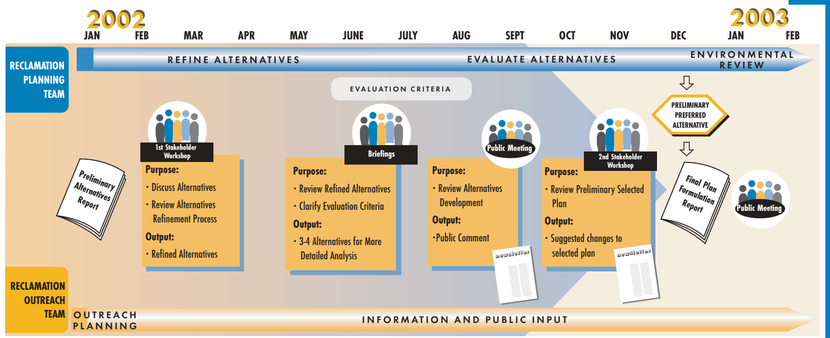

Reclamation is engaged in an active stakeholder outreach plan.

What's next?

Reclamation is continuing to define the optimum drainage alternative within each disposal concept. The goal is to have an Ocean Outfall, a Delta Outfall, and an In-Valley Disposal alternative. Once identified, these alternatives will be evaluated against each other to determine the preferred alternative for this project. Beginning in 2003, Reclamation will conduct an environmental review process for the alternatives, including the no-action alternative. During this process, public, organization, and agency representatives will have many opportunities to provide input. Reclamation will hold meetings for stakeholders that would be affected by the preferred alternative. Reclamation welcomes constructive input to help find an alternative that is technically feasible and implementable.

San Luis Drainage Feature Re-evaluation

U.S. Department of the Interior
Bureau of Reclamation

2800 Cottage Way
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Return Service Requested

September 2002

Contact Us!

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What's inside:

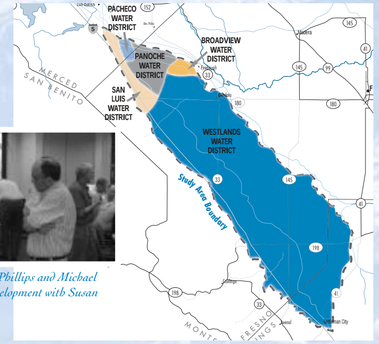
San Luis Drainage

Feature Re-evaluation

Introduction

Welcome to the first Bureau of Reclamation (Reclamation) newsletter for the San Luis Drainage Feature Re-evaluation. The newsletter will provide regular updates on the progress of the Re-evaluation. In addition, these newsletters will provide information about resources available on the web, or by direct request to Reclamation. We hope it is a useful resource for stakeholders participating at all levels of the Re-evaluation.

Reclamation Project leads, Jason Phillips and Michael Delamore, discuss alternatives development with Susan Hootkins, URS.



Drainage Challenges

Disposing of drainwater has posed challenges for farmers since the earliest days of irrigated agriculture. Unresolved, insufficient drainage can eventually rob even the best soil of its productive capacity.

In the San Luis Unit, insufficient drainage results in the accumulation of salt and water in the root zone of crops. Reclamation has identified more than 300,000 acres of land within the unit that face drainage challenges and may require drainage service.

In 1995, the Federal District Court in the Sumner Peck Ranch decision ordered Reclamation to follow the provisions of the legislation authorizing the development of the San Luis Unit, and provide drainage to impacted lands "without delay," by completing construction of the San Luis Drain to the Delta. The order came after decades of attempts to develop drainage solutions, with subsequent litigation and on-going technical investigations (see timeline inside). In 2000, with an appeal filed, the Ninth Circuit Court of Appeals affirmed the District Court ruling, but allowed Reclamation to consider possible drainage service solutions other than a drain to the Delta.

Given the specific direction of providing prompt drainage service and flexibility on how to provide service, Reclamation is working to accomplish the following:

- Verify which lands need drainage to maintain the arability of the soil throughout the San Luis Unit
- Determine the quantity of water that must be disposed in order to size the facilities to meet the drainage requirement
- Determine an approach for treating and disposing drainwater

Reclamation is following an approach to develop alternatives that involves technical analysis and stakeholder outreach and input while incorporating interim activities. The goal is to develop a system that is technically feasible and implementable. A diverse group of stakeholders are involved in this project and Reclamation is considering and incorporating their questions and comments.

As Reclamation proceeds with the evaluation of alternatives, stakeholders and the public will be asked to provide input and ask questions. Ultimately the goal of this process is to recommend the best drainage solution that has the greatest chance of implementation.

The following articles provide an overview of Reclamation's efforts to develop viable drainage solutions for detailed assessment later this year and develop meaningful stakeholder dialogue on the subject.

Working Toward a Drainage Solution

Demand for Drainage Service

One of Reclamation's first activities in the Feature Re-evaluation has been to determine the lands that require drainage service and the anticipated quantities of drainwater. Reclamation used data from previous studies to identify approximately 379,000 acres of drainage-impaired land that would require drainage service. To determine the amount of drainwater that these lands would produce, Reclamation evaluated the anticipated effectiveness of drainage source control activities. Historical data indicates that with standard farming practices, each acre will produce approximately 0.5 acre-feet of drainwater per acre of irrigated farmland per year (An acre-foot is the amount of water that would cover one acre of land with one foot of water). By implementing all possible levels of source control, the drainage can be reduced to approximately 0.3 acre-feet per acre of irrigated land. Intense, regional reuse of drainwater (applying drainwater to salt resistant crops or vegetation) could also reduce drainwater volume by approximately two-thirds. Preliminary analysis suggests it is cost effective to implement source control and regional reuse to reduce the drainage volume requiring service to 0.11 acre-feet per acre.

As the amount of drainage from each acre of irrigated land is reduced, the concentration of salts and other constituents in the drainwater increases. Each of the treatment and disposal alternatives Reclamation is examining has differing abilities to accommodate salts and other constituents. Using the information on the cost and effectiveness of source control, Reclamation determined that regional reuse facilities are a cost-effective means for reducing the volume of drainwater for all alternatives. For each preliminary alternative, Reclamation is also evaluating the cost-effectiveness of other source control measures, such as drainwater recycling, groundwater management, and seepage reduction.

Preliminary Alternatives Review

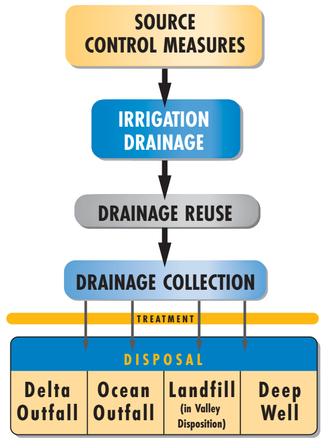
To develop a workable drainage solution that responds to the Court order, Reclamation is working to identify complete alternatives that are technically feasible and can be implemented promptly. Reclamation developed preliminary alternatives around four potential disposal methods: Ocean Outfall; Delta Outfall; In-valley Disposition; and Deep Well Injection. However, deep well injection, though utilized in other applications, is not considered a technically proven disposal option for the anticipated quantities of drainwater in the Central Valley. Reclamation is funding further investigations to determine if deep well injection might be implemented in combination with other disposal methods.

Reclamation updated the engineering design information on disposal options from previous studies to assemble and evaluate complete alternatives within each of the three remaining disposal options. A complete alternative includes all of the components necessary to provide drainage service to affected lands (see diagram), including collection, treatment, conveyance, and disposal. Additionally, all alternatives include source control and maximum regional reuse.

The preliminary alternatives review narrowed the list of alternatives to identify at least one within each disposal option. The Reclamation team considered four factors to determine the best alternatives within a disposal option: Cost (total present worth), time to implement, environmental responsibility, and public acceptability. The short list of alternatives is described below.

Through fall 2002, Reclamation will complete detailed evaluation of the short list of alternatives and compare among the disposal options to identify a preliminary preferred disposal alternative by the end of 2002. Once the preliminary preferred alternative is identified, Reclamation will complete the detailed environmental review and permitting.

Components of a Complete Drainage Solution



This diagram demonstrates the required components of a complete drainage solution and alternate disposal options

Definitions

Reverse Osmosis: A pressure-driven membrane operation used to separate constituents. This process produces high quality water and a highly concentrated brine.

Evaporation Ponds: Ponds constructed to retain drainwater while using the sun's energy to evaporate the water and reduce the volume of waste streams that require disposal.

Thermal Desalination/Enhanced Evaporation Systems: Mechanical devices installed at evaporation ponds to increase water evaporation. Increased temperature and surface area exposure result in a more rapid evaporation process.

Reuse: Using drainwater (possibly mixed with fresh water) to irrigate salt tolerant crops either on individual farms or at regional facilities.

Selenium Treatment: Selenium removal from drainwater through anaerobic bacteria, microalgal, or chemical treatment.

The Alternatives

Reclamation has been evaluating five alternatives for collection, treatment, and disposal of drainwater from the San Luis Unit, including Ocean Outfall, Delta Outfall, and In-Valley disposal alternatives. Reclamation is comparing the cost, implementation, environmental issues, and public acceptability of these alternatives to identify a preliminary preferred alternative by the end of 2002.

Ocean Outfall

The Ocean Outfall alternative would collect drainwater at three locations along the existing San Luis Drain and pump the water via pipes and tunnels across the Coast Range to the Pacific Ocean. The Reclamation team reviewed potential routes to the coast to use existing rights-of-way where possible, avoid sensitive resources, and minimize power and tunneling costs. The principal components of the ocean outfall conveyance include approximately 100 miles of pipeline and tunnel and two or three pumping plants. Reclamation reviewed previous reports on potential outfall locations and coastal marine resources to help minimize impacts to critical marine environments. Studies are focusing on outfall locations outside the Monterey Bay Marine Sanctuary to minimize potential impacts to this sensitive ocean resource. The potential offshore diffuser would be located between 1 and 2.5 miles from the coast.

Based on the current ocean discharge requirements, the Ocean Outfall alternative would not require drainwater treatment for selenium, salts, or other constituents. If this alternative is identified as the preliminary preferred alternative, additional treatment may be required if detailed ocean modeling during the permitting process shows the discharge could not meet these standards. Additionally, source control may be considered in combination with an Ocean Outfall strategy, if the lower cost of developing a system to convey reduced amounts of drainwater justifies the expense of implementing source control.

Delta Outfall

For the Delta Outfall, drainwater would be collected using the existing San Luis Drain. The drain would be extended approximately 75 miles over gradually sloping lands by canal and pipeline to the Sacramento-San Joaquin Delta. Water quality standards for the Delta would require drainwater treatment prior to release to the Delta. Further evaluations will determine what water quality levels are acceptable and which available technology could efficiently extract the constituents from the drainwater. The current cost estimates include treatment processes to remove selenium.

Reclamation is evaluating two potential outfall locations in the San Francisco Bay-Delta region. The first is near the confluence of the Sacramento and San Joaquin Rivers at the approximate location proposed for the original San Luis Drain (near Chipps Island). The second location is farther west in Carquinez Strait, downstream of existing municipal water supply intakes. The second location is being evaluated because it would benefit from greater tidal action, which would provide better mixing of drainwater and bay water.

In-Valley Disposal

An alternative to transporting drainwater out of the San Luis Unit is to treat and dispose drainwater in the San Joaquin Valley. Reclamation evaluated a full range of treatment and disposal technologies for the In-Valley alternative. Based on this evaluation, Reclamation's preliminary In-Valley alternative includes regional reuse facilities to reduce drainwater volume and selenium treatment facilities. The remaining drainwater would be routed to evaporation ponds where the final byproducts (salts) would be stored in place. Reclamation also determined that a reverse osmosis facility that would reclaim water from the drainwater stream would be cost-effective for the northern region of the study area. Reclamation is continuing to evaluate the effectiveness of additional source control measures and enhanced evaporation technologies to further reduce drainwater volume and the size of evaporation ponds.

Reclamation considered and eliminated two other In-valley alternatives from further evaluation. These alternatives conveyed drainwater to evaporation ponds without concentrating the drainwater in regional reuse facilities. Reclamation eliminated these alternatives based on adverse environmental impacts resulting from the size of evaporation ponds and related mitigation requirements. For example, for the alternatives that include regional reuse facilities, evaporation ponds would be from 4,500 to 5,700 acres; whereas the alternatives without reuse would require as much as 17,000 acres of evaporation ponds.

Other Considerations

Reclamation began this re-evaluation process considering a wide-range of possibilities. Reclamation has reviewed these various possibilities and used available information to determine the most feasible alternatives. The following are two disposal alternatives that Reclamation considered but do not currently have sufficient information to be considered in the detailed evaluations.

Deep Well Injection is a set of wells to inject drainwater or brine into deep geologic formations. This technology has not been demonstrated in the San Luis Unit area. Reclamation is currently identifying pilot studies to test the feasibility and reliability of deep well injection for drainwater disposal.

The Salton Sea was suggested as a potential disposal location for the drainwater. After reviewing available information, it appears that this location is not feasible due to the cost of transporting the drainwater more than 400 miles to the Salton Sea.